

In re Patent Application of:

DAIR ET AL.

Serial No. **09/833,242**

Filed: **April 10, 2001**

IN THE CLAIMS

1. (original) A fiber optic module for coupling photons between optoelectronic devices and optical fibers, the fiber optic module comprising:

a base;

a back plane including a plurality of edge connectors and a host connector to couple to a host system;

a plurality of printed circuit boards each having an edge connector and an optoelectronic device coupled thereto in parallel to the optical axis of the optoelectronic device, the plurality of printed circuit boards each having its respective edge connector coupled to the respective edge connector of the back plane; and

a shielded housing coupled to the base to encase the plurality of printed circuit boards to reduce electromagnetic interference (EMI).

2. (original) The fiber optic module of claim 1 further comprising:

an optical block coupled to each of the optoelectronic devices of the plurality of printed circuit boards, the optical block having

a plurality of openings to receive each of the optoelectronic devices of the plurality of printed circuit boards, and

a plurality of lenses to couple photons between each of the optoelectronic devices of the plurality of printed circuit boards and a plurality of optical fibers respectively.

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3. (original) The fiber optic module of claim 2 further comprising:

a nose to receive an optical fiber connector and to hold the plurality of optical fibers substantially fixed and aligned with the plurality of openings of the optical block.

4. (original) The fiber optic module of claim 3 further comprising:

a nose shield surrounding the nose to reduce electromagnetic interference.

5. (original) The fiber optic module of claim 1 wherein, the back plane includes traces between the plurality of edge connectors and the host connector.

6. (original) The fiber optic module of claim 1 wherein, the host connector is a plurality of pins.

7. (original) The fiber optic module of claim 1 wherein, the host connector is an electrical connector including a plurality of pins.

8. (original) The fiber optic module of claim 1 wherein, the plurality of printed circuit boards is a plurality of vertical printed circuit boards.

9. (original) The fiber optic module of claim 8 wherein, the plurality of vertical printed circuit boards are each arranged perpendicular to the base and parallel to each other to form a horizontal array of fiber optical channels.

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10. (withdrawn) The fiber optic module of claim 8 wherein, the plurality of vertical printed circuit boards are stacked up with each arranged perpendicular to the base to form a vertical array of fiber optical channels.
11. (withdrawn) The fiber optic module of claim 1 wherein, the plurality of printed circuit boards is a plurality of horizontal printed circuit boards.
12. (withdrawn) The fiber optic module of claim 11 wherein, the plurality of horizontal printed circuit boards are each arranged parallel to the base to form a horizontal array of fiber optical channels.
13. (withdrawn) The fiber optic module of claim 11 wherein, the plurality of horizontal printed circuit boards are stacked up with each arranged parallel to the base and to each other to form a vertical array of fiber optical channels.
14. (withdrawn) The fiber optic module of claim 1 wherein, the plurality of printed circuit boards is a plurality of slanted printed circuit boards.
15. (withdrawn) The fiber optic module of claim 14 wherein, the plurality of slanted printed circuit boards are stacked up with each arranged parallel to each other to form a vertical array of fiber optical channels.
16. (withdrawn) The fiber optic module of claim 14 wherein, the plurality of slanted printed circuit boards are each arranged parallel to each other on an angle with the base to

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form a horizontal array of fiber optical channels.

17. (withdrawn) The fiber optic module of claim 1 wherein,
the plurality of printed circuit boards is a combination
of slanted printed circuit boards and vertical printed circuit
boards.

18. (withdrawn) The fiber optic module of claim 1 wherein,
the plurality of printed circuit boards is a combination
of slanted printed circuit boards and horizontal printed
circuit boards.

19. (withdrawn) The fiber optic module of claim 1 wherein,
the plurality of printed circuit boards is a combination
of vertical printed circuit boards and horizontal printed
circuit boards.

20. (withdrawn) The fiber optic module of claim 1 wherein,
the plurality of printed circuit boards is a combination
of vertical printed circuit boards, horizontal printed circuit
boards and slanted printed circuit boards.

21. (original) The fiber optic module of claim 1 wherein,
each of the plurality of printed circuit boards includes
a ground plane on one side.

22. (original) A fiber optic module for coupling photons
between optoelectronic devices and optical fibers, the fiber
optic module comprising:

a cover;

a back plane including a plurality of edge connectors and

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a host connector to couple to a host system;

a plurality of vertical printed circuit boards each having an edge connector and an optoelectronic device coupled thereto in parallel to the optical axis of the optoelectronic device, the plurality of vertical printed circuit boards each having its respective edge connector coupled to the respective edge connector of the back plane; and

a housing coupled to the cover to protect the plurality of vertical printed circuit boards.

23. (original) The fiber optic module of claim 22 further comprising:

an optical block coupled to each of the optoelectronic devices of the plurality of vertical printed circuit boards, the optical block having

a plurality of openings to receive each of the optoelectronic devices of the plurality of vertical printed circuit boards, and

a plurality of lenses to couple photons between each of the optoelectronic devices of the plurality of vertical printed circuit boards and a plurality of optical fibers respectively.

24. (original) The fiber optic module of claim 23 further comprising:

a nose to receive an optical fiber connector and to hold the plurality of optical fibers substantially fixed and aligned with the plurality of openings of the optical block.

25. (original) The fiber optic module of claim 24 further comprising:

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a nose shield surrounding the nose to reduce electromagnetic interference.

26. (original) The fiber optic module of claim 22 wherein, the back plane includes traces between the plurality of edge connectors and the host connector.

27. (original) The fiber optic module of claim 22 wherein, the host connector is a plurality of pins.

28. (original) The fiber optic module of claim 22 wherein, the host connector is an electrical connector including a plurality of pins.

29. (original) The fiber optic module of claim 22 further comprising:

a plurality of optical blocks coupled to each of the optoelectronic devices of the plurality of vertical printed circuit boards, the plurality of optical blocks having

a plurality of openings to receive each of the optoelectronic devices of the plurality of vertical printed circuit boards, and

a plurality of lenses to couple photons between each of the optoelectronic devices of the plurality of vertical printed circuit boards and a plurality of optical fibers respectively.

30. (original) The fiber optic module of claim 29 further comprising:

a nose to receive an optical fiber connector and to hold the plurality of optical fibers substantially fixed and

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aligned with the plurality of openings of the optical block.

31. (original) The fiber optic module of claim 30 further comprising:

a nose shield surrounding the nose to reduce electromagnetic interference.

32. (original) The fiber optic module of claim 22 wherein, the housing is a shielded housing which is conductive.

33. (original) The fiber optic module of claim 32 wherein, each of the plurality of vertical printed circuit boards includes a ground plane on one side.

34. (original) The fiber optic module of claim 22 wherein, each of the plurality of vertical printed circuit boards includes a ground plane on one side.

35. (original) The fiber optic module of claim 22 wherein, each optoelectronic device of the plurality of vertical printed circuit boards is coupled thereto using a straddle mount configuration.

36. (original) The fiber optic module of claim 22 wherein, each optoelectronic device of the plurality of vertical printed circuit boards is coupled thereto using a through hole mount configuration.

37. (original) The fiber optic module of claim 22 wherein, each of the plurality of vertical printed circuit boards is perpendicular to the base to form a horizontal array of

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fiber optic channels.

38. (withdrawn) A fiber optic module for coupling photons between optoelectronic devices and optical fibers, the fiber optic module comprising:

- a cover;

- a back plane including a plurality of edge connectors and a host connector to couple to a host system;

- a plurality of horizontal printed circuit boards each having an edge connector and an optoelectronic device coupled thereto in parallel to the optical axis of the optoelectronic device, the plurality of horizontal printed circuit boards each having its respective edge connector coupled to the respective edge connector of the back plane; and

- a housing coupled to the cover to protect the plurality of horizontal printed circuit boards.

39. (withdrawn) The fiber optic module of claim 38 further comprising:

- an optical block coupled to each of the optoelectronic devices of the plurality of horizontal printed circuit boards, the optical block having

- a plurality of openings to receive each of the optoelectronic devices of the plurality of horizontal printed circuit boards, and

- a plurality of lenses to couple photons between each of the optoelectronic devices of the plurality of horizontal printed circuit boards and a plurality of optical fibers respectively.

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40. (withdrawn) The fiber optic module of claim 39 further comprising:

a nose to receive an optical fiber connector and to hold the plurality of optical fibers substantially fixed and aligned with the plurality of openings of the optical block.

41. (withdrawn) The fiber optic module of claim 40 further comprising:

a nose shield surrounding the nose to reduce electromagnetic interference.

42. (withdrawn) The fiber optic module of claim 38 wherein, the back plane includes traces between the plurality of edge connectors and the host connector.

43. (withdrawn) The fiber optic module of claim 38 wherein, the host connector is a plurality of pins.

44. (withdrawn) The fiber optic module of claim 38 wherein, the host connector is an electrical connector including a plurality of pins.

45. (withdrawn) The fiber optic module of claim 38 further comprising:

a plurality of optical blocks coupled to each of the optoelectronic devices of the plurality of horizontal printed circuit boards, the plurality of optical blocks having

a plurality of openings to receive each of the optoelectronic devices of the plurality of horizontal printed circuit boards, and

a plurality of lenses to couple photons between each of

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the optoelectronic devices of the plurality of horizontal printed circuit boards and a plurality of optical fibers respectively.

46. (withdrawn) The fiber optic module of claim 45 further comprising:

a nose to receive an optical fiber connector and to hold the plurality of optical fibers substantially fixed and aligned with the plurality of openings of the optical block.

47. (withdrawn) The fiber optic module of claim 46 further comprising:

a nose shield surrounding the nose to reduce electromagnetic interference.

48. (withdrawn) The fiber optic module of claim 38 wherein, the housing is a shielded housing which is conductive.

49. (withdrawn) The fiber optic module of claim 38 wherein, each of the plurality of horizontal printed circuit boards includes a ground plane on one side.

50. (withdrawn) The fiber optic module of claim 38 wherein, each of the edge connectors of the plurality of horizontal printed circuit boards includes one or more staggered pads to plug in the printed circuit board when the fiber optic module is hot.

51. (original) A fiber optic module for coupling photons between optoelectronic devices and optical fibers, the fiber optic module comprising:

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a base;

a back plane including a plurality of edge connectors and a host connector to couple to a host system;

a plurality of printed circuit boards each having an edge connector and an optoelectronic device coupled thereto in parallel to the optical axis of the optoelectronic device, each of the respective edge connectors of the plurality of printed circuit boards having staggered pads to couple to respective edge connectors of the back plane when powered up; and

a housing coupled to the base to protect the plurality of printed circuit boards.

52. (original) The fiber optic module of claim 51 further comprising:

an optical block coupled to each of the optoelectronic devices of the plurality of printed circuit boards, the optical block having

a plurality of openings to receive each of the optoelectronic devices of the plurality of printed circuit boards, and

a plurality of lenses to couple photons between each of the optoelectronic devices of the plurality of printed circuit boards and a plurality of optical fibers respectively.

53. (original) The fiber optic module of claim 52 further comprising:

a nose to receive an optical fiber connector and to hold the plurality of optical fibers substantially fixed and aligned with the plurality of openings of the optical block.

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54. (original) The fiber optic module of claim 53 further comprising:

a nose shield surrounding the nose to reduce electromagnetic interference.

55. (original) The fiber optic module of claim 51 wherein, the back plane includes traces between the plurality of edge connectors and the host connector.

56. (original) The fiber optic module of claim 51 wherein, the host connector is a plurality of pins.

57. (original) The fiber optic module of claim 51 wherein, the host connector is an electrical connector including a plurality of pins.

58. (original) The fiber optic module of claim 51 wherein, the plurality of printed circuit boards is a plurality of vertical printed circuit boards.

59. (original) The fiber optic module of claim 51 wherein, the plurality of printed circuit boards are a plurality of vertical printed circuit boards each arranged perpendicular to the base and parallel to each other to form a horizontal array of fiber optical channels.

60. (withdrawn) The fiber optic module of claim 51 wherein, the plurality of printed circuit boards are a plurality of vertical printed circuit boards each arranged perpendicular to the base to form a vertical array of fiber optical channels.

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61. (withdrawn) The fiber optic module of claim 51 wherein, the plurality of printed circuit boards is a plurality of horizontal printed circuit boards.

62. (withdrawn) The fiber optic module of claim 61 wherein, the plurality of horizontal printed circuit boards are each arranged parallel to the base to form a horizontal array of fiber optical channels.

63. (withdrawn) The fiber optic module of claim 61 wherein, the plurality of horizontal printed circuit boards are each arranged parallel to the base and to each other to form a vertical array of fiber optical channels.

64. (withdrawn) The fiber optic module of claim 61 wherein, the plurality of printed circuit boards is a plurality of slanted printed circuit boards.

65. (withdrawn) The fiber optic module of claim 64 wherein, the plurality of slanted printed circuit boards are each arranged parallel to each other to form a vertical array of fiber optical channels.

66. (withdrawn) The fiber optic module of claim 64 wherein, the plurality of slanted printed circuit boards are each arranged parallel to each other on an angle with the base to form a horizontal array of fiber optical channels.

67. (withdrawn) The fiber optic module of claim 51 wherein, the plurality of printed circuit boards is a combination of slanted printed circuit boards and vertical printed circuit

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boards.

68. (withdrawn) The fiber optic module of claim 51 wherein, the plurality of printed circuit boards is a combination of slanted printed circuit boards and horizontal printed circuit boards.

69. (withdrawn) The fiber optic module of claim 51 wherein, the plurality of printed circuit boards is a combination of vertical printed circuit boards and horizontal printed circuit boards.

70. (withdrawn) The fiber optic module of claim 51 wherein, the plurality of printed circuit boards is a combination of vertical printed circuit boards, horizontal printed circuit boards and slanted printed circuit boards.

71. (original) The fiber optic module of claim 51 wherein, each of the plurality of printed circuit boards includes a ground plane on one side.

72. (original) The fiber optic module of claim 51 wherein, each of the edge connectors of the plurality of printed circuit boards includes one or more staggered pads to plug in the printed circuit board when the fiber optic module is hot.